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Does the use of a non-tourniquet during high tibial osteotomy decrease postoperative pain? A Systematic review and Meta-analysis

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Faculty Disclosure Information

- Nothing to disclose

Introduction

- Tourniquet is commonly used during lower limb orthopedic surgery, such as fracture and total knee arthroplasty (TKA).[1]
- Tourniquet use in TKA and fracture surgery was associated with a reduced length of procedure and an increased incidence of complications.[2]
- High tibial osteotomy (HTO) is an effective procedure for medial osteoarthritis (OA).
- Many good outcomes of Open Wedge HTO (OWHTO) have been reported in the mid- to long-term.

The effects of non-tourniquet use during HTO are still controversial.

Purpose

- The purpose of this systematic review was to assess clinical outcomes during HTO with or without a tourniquet.

Methods

- A systematic review and meta-analysis were performed according to the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) 2020 guidelines.

- This protocol was registered in PROSPERO (CRD42024557931).

- The primary outcome was the short-term clinical outcomes including postoperative pain after HTO. Postoperative pain was evaluated using visual analogue scale (VAS).

- The secondary outcomes were operation time, total blood loss and deep vein thrombosis (DVT) as complications.

Methods: Literature Search Strategy

- PubMed, Cochrane Library and Scopus were searched to identify randomized controlled trials (RCTs) and prospective/retrospective comparative studies published before July 31th 2024.

- Search keywords included (“high tibial osteotomy” OR “HTO” and “tourniquet”).

- Exclusion criteria were basic study, review article, case report, technical note and non-English article.

Methods: Statistical Analysis

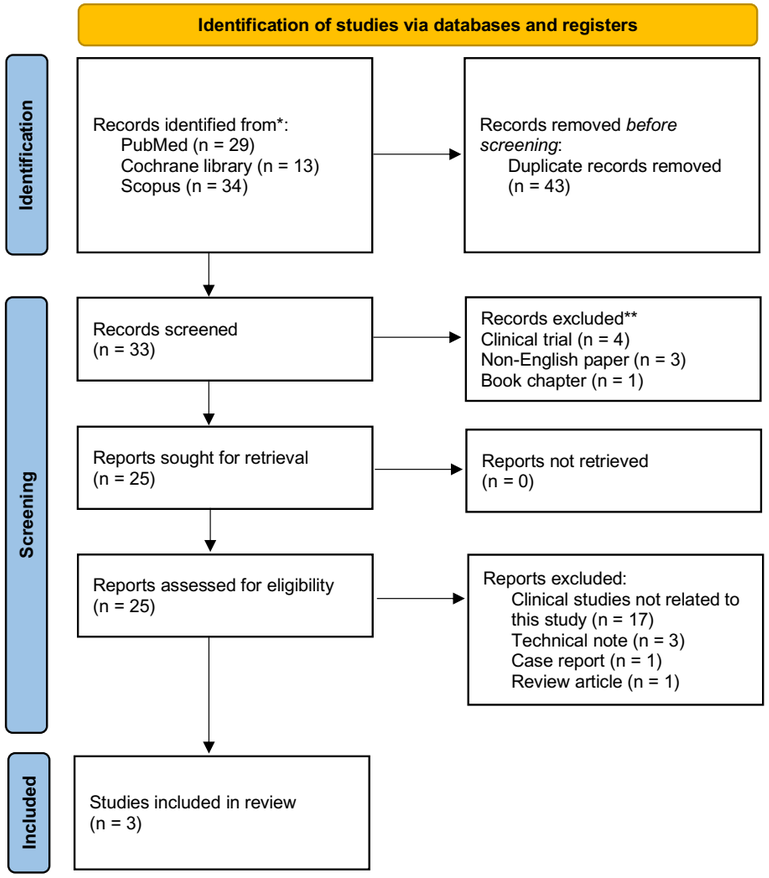
- Relevant data were extracted and analyzed statistically using a random-effects model.

- All statistical analyses were performed using “EZR” (Easy R) and p value < 0.05 was considered statistically significant.

Methods: Evaluation of Risk of Bias

- The Methodological Index for Non-randomized Studies (MINORS) appraisal tool was used to assess the quality of studies.[3]

Results



ID	First Author (year)	Journal	Location	Study type	Total No. of patients	Mean age	M/F	Type of HTO
1	Li (2022)[4]	Int Orthop	China	RCT	90	Non-tourniquet 59.7 ± 8.3 Tourniquet 58.8 ± 8.3	46/44	OWHTO
2	Wang (2021)[5]	BMC Musculoskelet Disord	China	Retrospective	62	Non-tourniquet 46.9 ± 12.3 Tourniquet 47.9 ± 11.7 69	28/34	OWHTO
3	Motycka (2000)[6]	AOTS	Austria	RCT	65	61.0 (range 38-77)	35/30	OWHTO

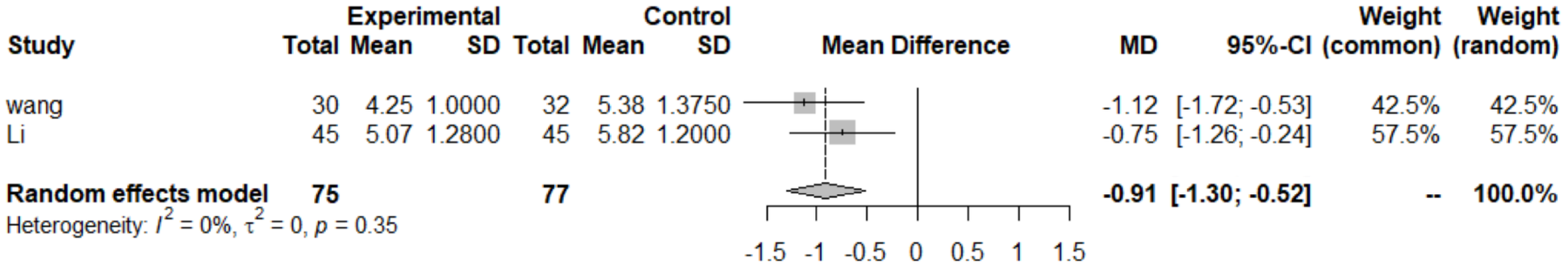
217 patients (94 males and 123 females) were included.

103 patients were in the non-tourniquet group and 114 patients in the tourniquet group.

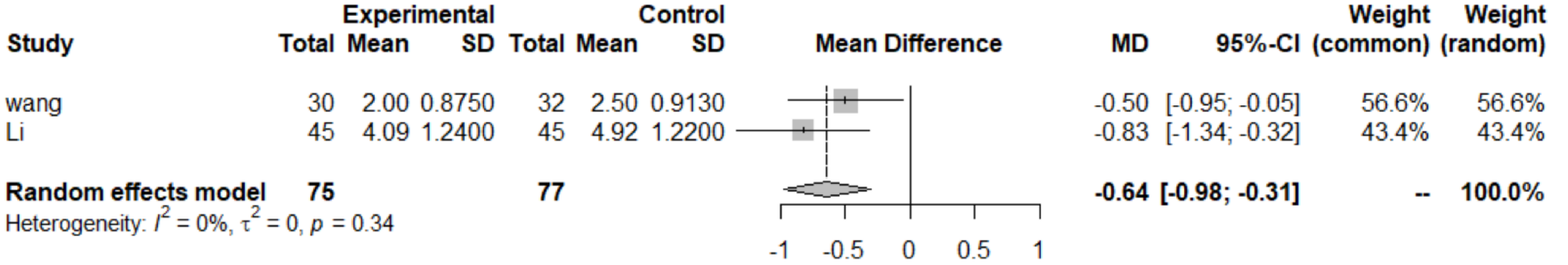
Mean MINORS score was 17.7.

Results: VAS

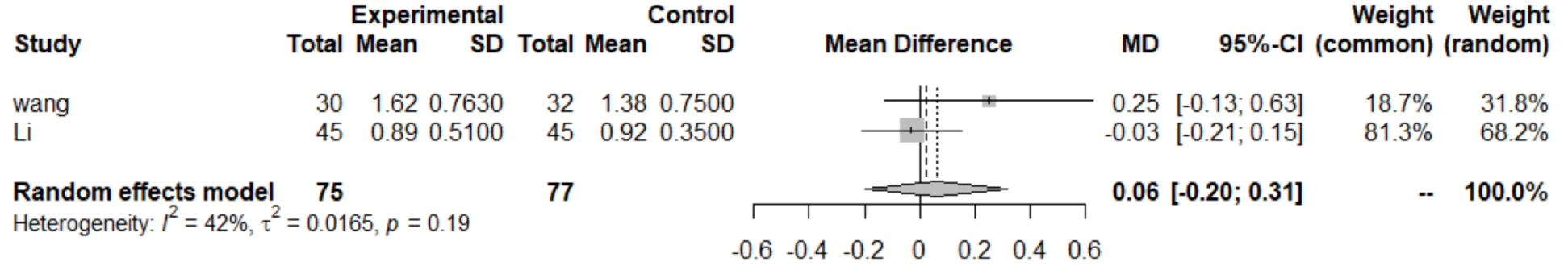
- Post 1 day



- Post 3 days



- Post 3 months



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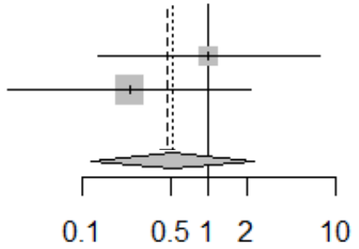
Post 1 and 3 days: Non-tourniquet group > Tourniquet group

Results: Complications

- **DVT**

Study	Experimental Events	Experimental Total	Control Events	Control Total	OR	95%-CI	Weight (common)	Weight (random)
wang	0	30	0	32			0.0%	0.0%
Li	2	45	2	45	1.00	[0.13; 7.43]	31.5%	54.8%
Motycka	1	28	5	37	0.24	[0.03; 2.15]	68.5%	45.2%
Random effects model		**103**		**114**	**0.52**	**[0.12; 2.30]**	--	**100.0%**

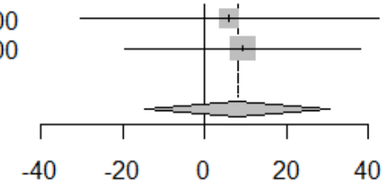
Heterogeneity: $I^2 = 0\%$, $\tau^2 = 0$, $p = 0.34$



- **Total blood loss**

Study	Experimental Total	Experimental Mean	Experimental SD	Control Total	Control Mean	Control SD	MD	95%-CI	Weight (common)	Weight (random)
wang	30	193.31	72.5600	32	187.39	73.9400	5.92	[-30.56; 42.40]	38.6%	38.6%
Li	45	287.59	62.5700	45	278.35	76.7600	9.24	[-19.69; 38.17]	61.4%	61.4%
Random effects model	**75**			**77**			**7.96**	**[-14.71; 30.63]**	--	**100.0%**

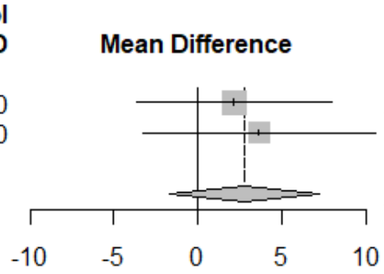
Heterogeneity: $I^2 = 0\%$, $\tau^2 = 0$, $p = 0.89$



- **Operation time**

Study	Experimental Total	Experimental Mean	Experimental SD	Control Total	Control Mean	Control SD	MD	95%-CI	Weight (common)	Weight (random)
wang	30	88.23	8.7200	32	86.09	14.0700	2.14	[-3.65; 7.93]	58.7%	58.7%
Li	45	112.69	17.0100	45	109.07	16.3600	3.62	[-3.28; 10.52]	41.3%	41.3%
Random effects model	**75**			**77**			**2.75**	**[-1.68; 7.19]**	--	**100.0%**

Heterogeneity: $I^2 = 0\%$, $\tau^2 = 0$, $p = 0.75$



Non-tourniquet group = Tourniquet group

Discussion: Enhanced recovery after surgery(ERAS)

- ERAS pathway enhanced patient recovery with a shortened length of hospital stay, reduced postoperative complications in lower limb arthroplasty.[7]

- Routine use of a tourniquet is not recommended in consensus statement in ERAS society.[8]

The results of this systematic review show that non-tourniquet use is useful for reduce the postoperative pain in HTO.

Discussion: Limitation

- This study only included 3 studies including 2 RCTs.
- The definition of non-tourniquet group was different in each study.
- Evaluation of DVT was different in each study.

Conclusion

- HTO without a tourniquet decreases postoperative pain at postoperative 1- and 3-day and does not increase the operative time, total blood loss and incidence of DVT.

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